size, the nuclei showed displacement and as regards the Nissl granules there was a condition of chromatolysis or achromatosis more or less complete. When the serum or cerebrospinal liquid from one of these animals was injected into the fourth ventricle of a normal dog this latter animal in a short time gave evidence of somnolence, more or less marked, and upon histological examination showed in the cerebral cortex degenerative changes of the same character as those described for the animal suffering from insomnia. On the basis of these and similar observations the author believes that he has demonstrated the formation during the waking condition of a toxin which may be supposed to have a direct effect in the production of natural sleep. As it accumulates it provokes a condition of fatigue or diminished irritability in the sensory-motor apparatus of the central nervous system, which under the usual conditions may pass into normal sleep. In cases of prolonged insomnia the greater accumulation of the toxine may lead to the production of distinct lesions in the cortical cells and finally to death. When the author comes to apply this idea to an explanation of the mechanism of the daily sleep he encounters a number of theoretical objections which are enumerated and discussed with commendable frankness. The fact that seems to him to be the most difficult to harmonize with his theory is the abruptness with which sleep may appear and disappear. On his view of a gradual intoxication of the nerve cells he admits that there should be a progressive development of somnolence as the toxine gradually depresses the activity of the nerve cells. In view of this difficulty he feels obliged to call upon a secondary hypothesis, suggested by the general views of Brown-Séquard, according to which the hypnotoxine under usual conditions does not paralyze or inhibit the cortical cells directly, but exerts its action indirectly by putting into play an inhibitory nervous mechanism of unknown nature which suspends reflexly the activity of the cells. The reader who follows the author's presentation of the positive results of his experiments, with an increasing conviction that here at last has been discovered a definite factor destined to throw light upon the causation of this mysterious daily rhythm, is conscious of a distinct feeling of disappointment when he is asked to accept this unattractive hypothesis of an intermediary inhibitory apparatus. One can only conclude that the author has made another addition to the long list of unsatisfactory theories of sleep. However, we must feel grateful to M. Piéron for an apparently very reliable presentation of the difficult literature of the subject, and for the experimental results which indicate that during insomnia a definite toxic material is formed in the body. It is to be hoped that his findings in regard to this hypnotoxine will be corroborated and extended by other observers, although it must be confessed that the experimental procedure involved in the production of long-continued insomnia is of such a character that few investigators are likely to be attracted to the work.

W. H. Howell

The Mosquitoes of North and Central America and the West Indies. By Leland O. Howard, Harrison G. Dyar and Frederick Knab. Volumes 1 and 2. Washington, D. C., Carnegie Institution. 1912. Published January and February, 1913.

Nearly thirty years ago I heard Cobbold, the well-known authority on parasitism, lecture on *Filaria sanguinis-hominis* and its relation to the mosquito. It was a good lecture, and created a profound impression; but we who discussed the marvel at that time little imagined what still remained hidden behind the curtain, the merest corner of which had been lifted. In those days the Culicidæ, whether regarded from the medical or entomological point of view, were supposed to be relatively unimportant. To-day it seems astonishing that we could have been so ignorant, and yet all the work that has been done is very far from exhausting the subject. In April, 1902, Dr. L. O. Howard applied to the Carnegie Institution of Washington for a grant "which should enable the preparation

of a monograph to include all possible information concerning all mosquitoes" of North and Central America and the West Indies. It was at first expected that the work could be completed in three years, and the grants made covered that period. At the end of that time, however, the work was considered still too imperfect to publish, and was continued for several years more with funds derived from other sources. We now have before us only part of the work, namely, the volume covering the subject in a general way, with a discussion of its medical aspects, and the volume of plates. The descriptions of the genera and species, with detailed information as to distribution and other matters, will follow at some later date.

To those who are not specialists in entomological taxonomy, the first volume is of course by far the most interesting and important, though the later parts will contain a larger proportion of original matter, and will bring out most clearly the great advances made in our knowledge of the Culicidæ by the authors. One's first impression on taking up the first volume is that of wonder at the space needed (520 pages) for what is, after all, a general introductory discussion. On perusing the separate chapters, we are inclined to change our attitude, and marvel rather that it has been possible to treat of so many important topics in a single volume. Then again, our first naïve astonishment that so much is known about mosquitoes gives way to a profound sense of the great amount there is yet to learn. The monograph is "complete" in the sense that it apparently includes all the important available information bearing upon its topic, but almost every chapter suggests to the mind of the reader numerous possible interesting researches. Thus the book is one of those live ones which will, as the result of one of its merits, soon become more or less out of date.

Modern science demands the publication of works which are too expensive and of too broad a scope to be, except in rare instances, prepared by a single man. Thus the mosquito monograph, due to three authors, and containing in addition extensive quotations from many others, stands as a type of the scientific monographs (if the word may still be allowed!) of the future. Prepared by men who are thoroughly familiar with the subject, having contributed many more new observations than any others in this country, it is very far from being a mere compilation; yet there has been no hesitation in compiling from the best sources in every case, with full credit given and usually the exact words of the writers cited. All this involves a certain sacrifice of ostensible originality, but it is much to be preferred to the method of many writers of general works, who, on the plea of uniformity of treatment, undertake to discuss subjects they do not understand, and in using other writings make all sorts of blunders. In the present instance the authors distinctly state that they are "entomologists and not physicians or medical investigators," and so the chapters dealing with medical matters "are not the result of original investigation," although it is well known that the senior author is an expert on medical entomology.

Following the Introduction is a chapter headed Early Accounts of Mosquitoes, which includes among other things a long and interesting quotation from Humboldt. The structure of the mosquito is discussed in about 80 pages, including the immature stages as well as the adult. Standard descriptions are quoted from Child, Dimmock, Kellogg, Nuttall and Shipley, Snodgrass, J. W. W. Stephens, Christophers, Raschke, Hurst, Eysell and others; but the original observations of the authors are more interesting than any of these, since they alone know enough species to give a good *comparative* account. So much that is significant appears from the comparative study of the different organs of various Culicidæ, that there is evidently a splendid field for further research along the same lines, especially in reference to the internal organs. When the taxonomic volume appears, it will no doubt be possible for workers in any part of the country to readily and accurately determine the species they may use in such studies.

The habits of mosquitoes, adults and young, are treated in 50 pages, followed by a detailed account of their natural enemies. This last topic is evidently capable of great extension, and it is evident that any intelligent amateur can readily add to what is known by observations in his own locality. The relation of mosquitoes to man occupies about 260 pages, covering both theoretical and practical aspects. The very clear and well written, but not in the least sensational, accounts of the discovery of the connection between mosquitoes and malaria and yellow fever ought to be reprinted and distributed broadcast over the country. Some bulletins of the Department of Agriculture give useful practical information about mosquitoes and disease, and there are various other more or less accessible publications dealing with these matters; but would it not be a good thing if the plain, unvarnished, historical account of the work of Manson, Ross, Grassi, Finlay, Reed, Carroll and Lazear (and we should like to add portraits of these men) could be sent, in the form of a pamphlet, to every school in North America? We offer the suggestion to Mr. Carnegie. To this account might be added the words of the authors, who after describing brilliant anti-malarial work in foreign countries, are obliged to say: "In the United States, it is sad to relate, almost nothing has been done in the way of an active campaign against malaria alone, even in restricted localities. It is true that extensive work has been done against mosquitoes, but in the most of these cases the incentive does not seem to have been to better the health of the people or to stamp out malaria." The volume ends with a bibliography and a very complete index.

The second volume contains 150 beautiful plates, illustrating the structural characters of the eggs, larvæ, pupæ and adults. In a work otherwise characterized by such conscientious crediting of all assistance, it is surprising to see no reference to the artist or artists of the plates; doubtless this information will be given in the next volume.[1] We note that in the names of species, no attempt is made to alter the terminations of adjectival specific names to make them agree in gender with the names of the genera to which they are referred.

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Trees in Winter: their Study, Planting, Care and Identification. By Albert Francis Blakeslee, Ph.D., Professor of Botany and Director of Summer School, Connecticut Agricultural College, and Chester Deacon Jarvis, Ph.D., Horticulturist, Storrs Experiment Station. Illustrated Octavo, 446 pp. New York, The Macmillan Company. 1913.

About a year ago the writer of this review had the pleasure of making a short notice[1] of Bulletin 69 of the Storrs Agricultural Experiment Station, entitled "New England Trees in Winter" by the authors of the work now under consideration. Then we said "We do not recall any better treatment of our trees than is to be found in this publication." Further use of the bulletin confirms the favorable impression made on its first appearance. We have now a very considerable enlargement and revision of the bulletin in the form of the stout volume whose name appears at the head of this review. In revising the earlier publication the authors have introduced chapters on the structure, life and growth of trees, their propagation, tree planting in the country and the city, how to plant, care, common injuries, control of parasites, insecticides, etc. In these chapters the authors have managed to condense a great deal of valuable information for the general reader, and especially for the owner of a piece of ground on which trees are now growing, or on which the owner wishes to plant trees. Nor do they present the growing of trees merely from the standpoint of utility, although that is sufficiently empha-

[1] I have since learned that the drawings of whole larvæ and the detail drawings of larvæ (plates 86–131) are by Mr. Knab, part of the latter inked in by Miss Mary Carmody. The male genitalia are drawn by Miss Carmody; the eggs (plates 146–147) are by Miss E. G. Mitchell. The photograph of *Anopheles* wings is by Mr. H. S. Barber.

[1] Science, March 22, 1912.